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January 14, 2000

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Ms. Magalie Roman Salas
Secretary
Federal Communications Commission
445 12th Street, S.W., TW-A325
Washington, DC 20554

Re: Application for Consent to the Transfer of Control of Licenses from Sprint Corporation to MCI WorldCom, Inc. - CC Docket No. 99-333

Dear Ms. Salas:

On November 17, 1999, Sprint Corporation ("Sprint") and MCI WorldCom, Inc. ("MCI WorldCom" and together "the Applicants") filed an application for consent to transfer control of Sprint's licenses and authorizations to MCI WorldCom. In a letter dated December 15, 1999, FCC General Counsel Christopher Wright requested that the Applicants submit additional information, including "a description of the Internet services provided by MCI and Sprint, an assessment of the public interest impact of the merger on the market for these services, and any additional information that you believe will assist the Commission in its public interest analysis."

With this letter and by their undersigned counsel, the Applicants are pleased to submit the information requested by the Commission to further its public interest assessment of the proposed merger of MCI WorldCom and Sprint.

Respectfully submitted,

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cc: Christopher Wright

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SUPPLEMENTAL INTERNET SUBMISSION

CC DOCKET NO. 99-333

I. Introduction

The following discussion augments the November 17, 1999 Application of MCI WorldCom, Inc. (MCI WorldCom) and Sprint Corporation (Sprint).[1] This submission includes a description of the companies' Internet businesses, relevant recent developments, and an explanation of the proposed merger's consistency with the public interest. Stated briefly, the period since the Commission's review of the Internet in the WorldCom / MCI merger proceeding has been characterized by continued substantial growth in all segments of the industry. Existing Internet Service Providers ("ISPs") have expanded their facilities to meet the tremendous increase in demand from other ISPs as well as residential and business customers. New entrants and smaller ISPs have acquired control of significant Internet network facilities through new construction and strategic acquisitions. Although the provision of Internet services is competitive, the Applicants recognize that parties may raise issues regarding the effect of adding Sprint's Internet backbone business to MCI WorldCom's. MCI WorldCom and Sprint reiterate their commitment to work cooperatively with policymakers to address and resolve concerns that they may have regarding Sprint's Internet backbone business.

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[1] *Applications of Sprint Corporation, Transferor, and MCI WorldCom, Inc., Transferee, for Consent to Transfer Control for Corporations Holding Commission Licenses and Authorizations Pursuant to Sections 214 and 310(d) of the Communications Act and Parts 1, 21, 24, 25, 63, 73, 78, 90 and 101*, CC Docket No. 99-333 (filed Nov. 17, 1999) ("*Application*").

II. Background

The Internet. The Internet is an interconnected "network of networks" that carries bits of data between two or more computers. It operates as a mesh of thousands of networks, interconnected pursuant to open standards and maintaining interdependent relationships. The technology underlying the Internet -- TCP/IP protocol -- is designed to facilitate transport among networks, whether global, national, regional, or local, over many alternative paths. This technology is completely open, as is the participation in the standards bodies seeking to maintain and improve this protocol.

The essence of the Internet is universal connectivity, where every end user has the ability to have access to every address on the Internet. In achieving this global interconnectivity, each network is dependent on every other network, and no one network, or even a class of networks, is wholly dependent upon any other. All networks need to be able to connect with one another in order to ensure that communications can be routed to all parts of the world.

In the 1997 Office of Plans and Policy working paper *Digital Tornado*, Kevin Werbach described the Internet as a "fluid, complex entity." The paper stressed the unique qualities of the Internet:

> Because the Internet represents an ever-growing interconnected network, no one entity can control or speak for the entire system . . . . Numerous users can share physical facilities, and the mix of traffic through any point changes constantly through the actions of a distributed network of thousands of routers. . . . [T]he uncertainty of the Internet is a strength, not a weakness. With decentralization comes flexibility, and with flexibility comes dynamism. Order may emerge from the complex interactions of many uncoordinated entities, without the need for cumbersome and rigid centralized hierarchies.[2]

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[2] Kevin Werbach, *Digital Tornado: The Internet and Telecommunications Policy* (OPP Working Paper Series No. 29), Federal Communications Commission, March 1997, at ii.

This description of the Internet continues to be true today; indeed, technological advances, such as mirroring, caching, and the deployment of Asynchronous Transfer Mode (ATM) platforms at public peering locations, have contributed further to the distributed, flexible, dynamic nature of the Internet.

Perhaps because of the flexibility and dynamism of the Internet, there is no common lexicon for Internet services. This contributes to the difficulty of interpreting publicly available data about the Internet. For purposes of this submission, we describe below Internet access and value-added services, as MCI WorldCom and Sprint use those terms. It should be noted, however, that other sources of data about the Internet, such as those included in the attachments to this submission, may not employ these terms in the same way.

Internet Access Services. Connectivity to the Internet is provided by ISPs. The Internet access service business is similar to the traditional long distance service business in that some companies offer service through facilities that they own or lease, while others resell service from such facilities-based providers, and still others provide service through a combination of their owned or leased facilities and resold services. Similarly, many ISPs provide Internet access services using their own backbone networks. Facilities-based ISPs are sometimes called Internet backbone providers or IBPs. Other ISPs offer service entirely by purchasing Internet access service at wholesale and reselling it at retail. And other ISPs provide access through a combination of their own facilities and resale.

The Commission has previously described an "Internet backbone" network as consisting of "routers connected together by high-speed data lines."[3] The components of such networks are

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[3] *Application of WorldCom, Inc. and MCI Communications Corp. for Transfer of Control*, 13 FCC Rcd. 18025 (1998) ("*WorldCom/MCI Order*") at n. 383.

widely available and scalable. A number of manufacturers, not including MCI WorldCom or Sprint, sell routers, and an ISP can increase the capacity of its routers to match traffic growth. Long-haul transmission capacity is available from a wide variety of suppliers, either by purchase or through short-term or long-term lease arrangements.[4] These transmission facilities carry all types of traffic – voice and data, circuit-switched and packet-switched – and the transmission capacity used for Internet services is fully substitutable with capacity used for voice and other traffic.

The minimum viable scale is relatively small, especially given an ISP's ability to interconnect with other ISPs at multiple public network access points. Backbone networks are connected with each other through peering and other arrangements so that subscribers to Internet access services have connectivity to virtually any other point on the Internet.

Internet access today is offered primarily in two ways: on a dedicated and on a dial-up basis. Dedicated Internet access connects a customer to the Internet via a point-to-point transmission link to the network of the ISP. Dedicated Internet access is offered both on a wholesale and a retail basis. Wholesale dedicated Internet access service is purchased by ISPs that have either limited or no network facilities and that resell Internet connectivity to retail end user customers.[5] Dedicated Internet access is also provided on a retail basis to end users. In the past, the primary customers of retail dedicated Internet access have been larger businesses. Today, residential customers are becoming a much more significant source of demand for this

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4 *See generally Application*, Declaration of Besen and Brenner, Section II.

5 Dedicated Internet access service is also called "transit." *See also Worldcom/MCI Order* at ¶ 146 ("In a transit arrangement between ISPs, one ISP pays another in return for the second ISP's agreement to deliver all Internet traffic that originates or terminates on the first ISP's network, regardless of the destination or source of that traffic.")

service, due to the increasingly widespread deployment of cable modems and Digital Subscriber Line (DSL) services.[6]

In addition to dedicated Internet access, many ISPs offer "dial-up" Internet access. Like dedicated access, dial-up access is provided on both a wholesale basis and on a retail basis. Wholesale dial-up access service is provided to ISPs for resale to end users and involves the provision of both access to modem banks as well as a link between the modem bank and the ISP wholesaler's network. An ISP's retail dial-up Internet access offering enables individual end user customers to connect to a modem bank that the ISP operates. The ISP aggregates the dial-up traffic at the modem bank and routes the traffic over a dedicated facility to a node, which, in turn, is interconnected to the Internet.[7]

In sum, wholesale and retail Internet access services simply provide ISPs, and business and residential customers, with Internet connectivity.

Value-Added Services. In addition to the Internet access services described above, many ISPs sell related "value-added" services, including web hosting, collocation, and security products. Web hosting allows a customer to place its web content, for example, a web page, on a server owned and operated by the ISP. Collocation enables the customer to place the customer's server in space that is owned by the ISP. Security services include the sale and management of

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6 In its recent *Line Sharing Order*, for example, the Commission observed that DSL line deployment is projected to increase from 575,000 by the end of 1999 to more than 7.6 million by the end of 2002. Deployment of Wireline Services Offering Advanced Telecommunications Capability, *Third Report and Order*, CC Dkt. 98-147, FCC 99-355 (rel. Dec. 9, 1999) at n.8.

7 If the ISP only operates the modem bank, it provides access to the Internet by purchasing wholesale dedicated Internet access service from another ISP. *See also WorldCom/MCI Order* at n. 384 (distinguishing the links from the end-user to an ISP and from an ISP to an Internet backbone provider's point of presence from the Internet access service provided by Internet backbone providers.)

firewalls which are designed to permit Internet traffic to flow between the customer's computers and other sites on the Internet, without allowing unauthorized users to access the customer's internal files.

Peering and Network Access Points (NAPs). ISPs may exchange traffic under peering arrangements in which one ISP agrees to deliver Internet traffic to locations on its own network in exchange for the other ISP's agreement to deliver traffic to locations on its network. Traffic may be exchanged through a public peering arrangement at a NAP, where multiple peers exchange traffic, or through a private peering arrangement where ISPs establish direct connections for the exchange of traffic.

NAPs are, in effect, meeting places where ISPs exchange traffic through individually negotiated peering arrangements. ISPs can lease rack space and cross connects from the NAP operator in order to link their facilities to other ISPs located at the NAP. The ISPs, not the NAP operator, determine with whom they wish to interconnect. In 1999, there were a total of 44 public peering points in the United States operated by numerous firms,[8] an increase of 12 percent from the 39 NAPs in operation in 1998, and a more than ten-fold increase from 1995.[9] In addition, the recent deployment of ATM switches at some NAPs has increased the number of ports and the amount of capacity available to ISPs at those locations.

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8 *See* http://www.ep.net/naps_na.html.

9 *See* "The Internet – What is It?," *Boardwatch Magazine's Directory of Internet Service Providers* (11th ed., 1999) at 2, 27-176, http://boardwatch.internet.com/isp/summer99/internetarch.html (last visited Jan. 12, 1999) (in 1994, the National Science Foundation announced that four NAPs would be built).

III. MCI WorldCom and Sprint Internet Services

MCI WorldCom Internet Services. MCI WorldCom is a leading provider of Internet access services. Specifically, through UUNET, MCI WorldCom offers an array of retail and wholesale Internet access services, including dial-up and dedicated access. Separately, MCI WorldCom offers retail dial-up Internet access service to residential customers, either on a stand-alone basis or in conjunction with telecommunication services.

UUNET also offers various value-added services. Specifically, it provides web hosting services on shared or dedicated web servers. In addition, UUNET provides collocation at data centers, application hosting (including e-commerce solutions), and Internet security services (*e.g.*, firewalls).

Sprint Internet Services.[10] Sprint's principal Internet backbone service is SprintLink. SprintLink uses a packet-over-SONET architecture that runs on Sprint's nation-wide fiber network and operates at speeds up to 2.5 gigabits per second (OC-48). Sprint also owns and operates ICM, a very small Internet backbone that provides dedicated access in the United States to mostly non-U.S. educational and government customers. ICM operates at OC-3 (155 megabits per second). Together, SprintLink and ICM serve some 3,000 customers.

In addition to these Internet services, Sprint offers connectivity services over a private access network known as DialNet. DialNet is also a packet-over-SONET network that operates at up to OC-3. DialNet was designed to (and is still principally used to) provide customers with

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[10] Sprint has no Internet infrastructure outside the United States, instead relying on Global One to provide the services outside of France and Germany and the other Global One parties to provide Internet services in their respective home countries (*i.e.*, Deutsche Telekom in Germany and France Telecom in France). As described in the *Application*, Sprint is currently holding discussions regarding the future of Global One. *Application* at n.138.

local, dial-up access that they can in turn offer to their users. DialNet is used by Sprint customers, such as America Online ("AOL"), to provide access to online data servers. Specifically, DialNet provides to AOL a dedicated link from AOL's modem banks to AOL's facilities in Northern Virginia, but does not provide Internet access. DialNet is also used by other Sprint customers, such as EarthLink Network, Inc. ("Earthlink"), to aggregate traffic at dial-up locations and deliver that traffic to SprintLink, which provides Internet access service. In this case, DialNet provides both the modem banks and a dedicated link to SprintLink. DialNet is used by other Sprint corporate customers to provide access to their LANs. Although DialNet does not offer connection to the Internet, [11] Sprint treats DialNet as Internet-related service revenues.

Sprint does not provide residential dial-up Internet access services, although it does have a marketing agreement with EarthLink relating to the sale and provisioning of such services.[12] Sprint also offers two value-added services: web hosting and managed security services.

MCI WorldCom and Sprint Network Access Points. MCI WorldCom operates national NAPs[13] at the following locations: Washington, DC (MAE East) , San Jose, CA (MAE West) and Dallas, TX (MAE Central) , as well as four smaller regional MAEs in Los Angeles, Houston, Chicago, and New York. At these locations, ISPs lease rack space and cross connects from MCI WorldCom to link their facilities to other providers of Internet services. MCI WorldCom has deployed ATM platforms at all of its national NAPs. As discussed in greater detail below, this

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11 *See* p. 7, *supra,* and accompanying footnotes. *See also WorldCom/MCI Order* at n. 384.

12 Sprint also currently holds approximately one fourth of the equity in EarthLink and has the right to elect two members of EarthLink's directors, although Sprint's ownership and governance rights may change as a result of the proposed EarthLink-MindSpring merger.

13 Some NAPs are called "MAEs" (metropolitan area exchanges).

upgrade was designed to facilitate peering and reduce traffic congestion at those locations by increasing the number of ports and bandwidth capacity available to ISPs. Sprint operates a NAP in New Jersey.

IV. The Proposed Merger

A. FCC Framework

In the WorldCom/MCI merger proceeding, the Commission examined the potential competitive effects of the merger between MCI and WorldCom as it related to Internet services.[14] Based on the record before it, the Commission found that the merger was in the public interest, provided that MCI fulfilled its commitment to divest its Internet business. The Commission concluded that the proposed divestiture, which previously had been required by the Department of Justice and by the European Commission, would alleviate any alleged anticompetitive concerns.[15]

The Commission observed that there are "three classes of [Internet] participants: end users, Internet service providers (ISPs), and Internet backbone providers (IBPs)."[16] It described ISPs as firms that "enable end users to access Internet backbone networks" and described IBPs as firms that "route traffic between ISPs and interconnect with other IBPs."[17] The Commission further noted that many firms serve as both ISPs and IBPs.[18] In addition, although IBPs compete

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14 *WorldCom/MCI Order* ¶¶ 142-161.

15 *Id.* ¶¶ 147-56.

16 *Id.* ¶ 143.

17 *Id.*

18 *Id.*

with one another for ISP customers, they "must also cooperate with one another, by interconnecting, to offer their end users access to the full range of content and to other end users . . . ."[19]

The Commission declined to reach any final determination regarding market definitions, but stated that it was "inclined to agree" with those commenters that had argued that the provision of "Internet backbone services" was a separate relevant market, defined as "the transporting and routing of packets between and among ISPs and regional backbone networks."[20] The Commission assumed without analysis that the geographic market was national in scope.

The Commission's Order recited the assertions of some commenters that combining MCI's and WorldCom's "Internet backbone" businesses would be anticompetitive and that alleged difficulties in obtaining peering arrangements after the merger might be a "barrier to entry" to competing providers of "Internet backbone services."[21] While the Commission indicated that it was "concerned about the interconnection difficulties" that commenters hypothesized might occur, it agreed that the merger proceeding was not "the appropriate forum to address these concerns."[22] Without determining the merits of these assertions, the

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19 *Id.* ¶ 144.

20 *Id.* ¶¶ 148-150 (citation omitted). As more fully described in the Order:

"Internet backbone services can ensure the delivery of information from any source to any destination on the Internet. The facilities used to provide such Internet backbone services are routers and the high-speed transmission lines that connect these routers . . ."

21 *Id.* ¶ 150.

22 *Id.* ¶ 155 (citations omitted). The FCC subsequently reviewed the issue of peering in its Advanced Services proceeding, and determined intervention was neither necessary nor desirable. *See* Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, *Report,* CC Docket No. 98-146 (rel. Feb. 2, 1999) ("*Advanced Services Report*") ¶ 105.

Commission concluded that the proposed divestiture of MCI's Internet assets would alleviate any competitive effects that may have arisen from the merger in its original form.[23]

The remainder of the Order's discussion of Internet services related to the scope of the proposed divestiture, and to certain international pricing issues that have been pressed (unsuccessfully) by certain carriers in a number of proceedings before the Commission.[24] In both areas, the Commission concluded that no action on its part was necessary. With respect to the divestiture remedy, the Order rejected arguments for modification. In the case of the international issues, the Order concluded that the record did not support the claims advanced and, in any event, expressly decided that the merger was not the appropriate forum in which to address such complaints. The Commission noted that commenters would be free to press any claims regarding MCI WorldCom's common carrier obligations pursuant to section 208 of the Act.

B. MCI WorldCom / Sprint Merger

We present below an overview of the changes in the Internet industry that have occurred in the months since the WorldCom / MCI merger was approved by the FCC. Although the Commission did not find in the *WorldCom/MCI Order* that "Internet backbone services" is a separate relevant product market, the following discussion also addresses that industry segment, as defined in that *Order*.

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23 *WorldCom/MCI Order* ¶ 155.

24 *See, e.g., International Settlement Rates, Report and Order*, IB Docket No. 96-261, 12 FCC Rcd. 19806 (1997) ("Accounting Rate Benchmarks Order") *aff'd sub nom. Cable & Wireless P.L.C. v. Federal Communications Commission*, 166 F.3d 1224 (D.C. Cir. 1999).

1. Internet Growth

Since 1998, the Internet industry has grown at a phenomenal rate. The number of Internet users has increased worldwide from approximately 50 million in 1998 to approximately 200 million today. Since 1997, the number of ISPs (facilities-based and resellers) has increased by nearly 40%,[25] and the number of points-of-presence per carrier has increased by five times;[26] the number of hosts connected to the Internet has more than quadrupled;[27] Internet traffic has increased from six to ten times;[28] and over $1 trillion has been invested in Internet-related infrastructure. According to CIX, the number of domestic ISPs now exceeds 6,500, with many providing Internet access on a regional or national basis.[29] New and formidable facilities-based ISPs have entered the industry or expanded their presence, including AT&T, Global Crossing, Qwest Communications (with a current market capitalization of approximately $32 billion), and Level 3 Communications (with a current market capitalization of approximately $29 billion). In

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25 Cahners In-Stat Group, *The U.S. ISP Industry: What is it Earning? What is it Spending?*, Table 2, Vendor-Projected U.S. ISP Market Sizing, 1997-1998, Report #IS99-01MC (April 1999), http://www.instat.com/abstracts/ia/1999/is9901mc_abs.htm (last visited Jan. 12, 1999).

26 *Id.* at Figure A4: Average Number of Points of Presence Per ISP, 1997-1998.

27 M. Lottor, Network Wizards, July 1999 Survey, http://isc.org/ds/www-9907/report.html (last visited Jan. 12, 1999). A "host" is defined as a computer connected to the Internet with a static IP address that can respond to a query.

28 Gilder Technology Group, 1999 Newsletter, http://gildertech.com/html/gtg.html (last visited Jan. 12, 1999).

29 *See Petition for Reconsideration and Clarification*, Computer III Further Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review of Computer III and ONA Safeguards and Requirements, CC Docket Nos. 95-20 and 98-10, filed by the Commercial Internet eXchange Association ("CIX"), (Apr. 26, 1999) at p.1. For a description of the steady increase in commercial ISPs in the United States over the past ten years, *see* Letter from Barbara Dooley, CIX, to John Reel (*sic*), FCC, in CC Docket Nos. 95-20 and 98-10 (dated January 8, 1999).

addition, demand for broadband Internet access from business and residential consumers has increased substantially with the growing deployment of high speed cable modem and Digital Subscriber Line (DSL) services. It bears emphasis that even with the remarkable demand growth of the past few years, Internet subscriber penetration is still comparatively low. The clear evidence of growth indicates that new entrants have not encountered significant barriers to entry. Other factors support this conclusion, as discussed below.

2. Growth of "Backbone Providers"

Since the time of the WorldCom/MCI merger proceeding, suppliers of Internet connectivity have grown in number and expanded their physical presence. It is difficult to determine with precision the number of ISPs that operate national backbone networks because different sources may rely on different definitions of what is a backbone service. What is clear, however, is that the number of entities that operate nodes, routers and transmission links that provide access to the Internet is large and is growing. *Boardwatch Magazine's ("Boardwatch")* recently identified 46 national backbone providers.[30]

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[30] *See Boardwatch Magazine's Directory of Internet Service Providers* (11th ed., 1999) at 2, 27-176.

Table 1

Directory of National Internet Backbone Providers

1-Terabit	Internet Access/GetNet
@Home	Internet Services of America
AboveNet	ITC DeltaCom
Apex Global Information Services (AGIS)	IXC Communications, Inc.
AT&T / IBM Global Services	Level 3
Bell Canada/Bell Nexxia	MCI WorldCom
Cable & Wireless USA	NetRail
CAIS	Network Two
Concentric	PSINet, Inc.
CRL Network Services	Qwest/Icon CMT
Digital Broadcast Network Corp.	Road Runner
Electric Lightwave	Rocky Mountain Internet/DataXchange
EPOCH Networks, Inc.	Savvis Communications Corp.
e.spire	ServInt
Exodus	Splitrock Services
Fiber Network Solutions	Sprint IP Services
Frontier Global Center	Teleglobe
Globix	Verio
GTE Internetworking	Visinet
GST Communications	Vnet
ICG/Netcom Online	Williams
IDT Internet Services	Winstar/Broadband
Intermedia Business Internet	ZipLink

Source: *Boardwatch Magazine's Directory of Internet Service Providers* (11th ed., 1999) at 5, 27-206.[31]

Moreover, in 1999, Boardwatch reported twelve newcomers to its list of Internet backbone providers: 1 Terabit, AboveNet, DBN Corp., e.spire, Globix, GST Communications, ITC DeltaCom, Network Two, Road Runner, Splitrock Services, Teleglobe, and Williams Communications.[32]

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[31] Five companies included in this table were not listed separately in Boardwatch's directory, although they were specifically discussed in the publication (at p. 5) and the editors acknowledged that they were fully qualified. *Id.* at p. 5.

[32] *Id.* at p. 6.

The growth of new entrants that have constructed and are continuing to expand their own national and international networks over this period is particularly striking. New construction and consolidation have enabled companies with smaller Internet businesses to evolve into significant providers of backbone-based services. Examples of these networks include Qwest, Level 3, Frontier, AT&T, Verio, Intermedia/Digex, @Home, and Teleglobe. Moreover, the Commission's recent decision authorizing the entry of Bell Atlantic into in-region interLATA services in New York may mark the beginning of the development of a new group of backbone service providers.[33] The Regional Bell Operating Companies in the last few years have offered Internet access service in areas where they provide local telephone service. As the RBOCs gain the necessary approvals under section 271 of the Communications Act of 1934, as amended, they will be able to create Internet backbones using their interLATA networks.

The growth in Internet backbone facilities has been documented in the Commission's recent proceeding on the current state of advanced services deployment.[34] Although the Commission looked at all broadband facilities, including both "last mile" facilities and "backbone facilities,"[35] and thus its inquiry was broader in scope than Internet backbone services, its analysis is relevant here. The Commission reported that investment in broadband facilities "is occurring at a major scale"[36] and that the industry as a whole has "made tens of billions of dollars

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33 Application by Bell Atlantic New York for Authorization Under Section 271 of the Communications Act To Provide In-Region, InterLATA Service in the State of New York, *Memorandum Opinion and Order*, CC Docket No. 99-295, FCC 99-404 (rel. Dec. 22, 1999).

34 *See Advanced Services Report*, *supra* n. 22.

35 *Id.* ¶ 13.

36 *Id.* ¶ 36.

of investment in broadband facilities."[37] In particular, the Commission found substantial recent activity to construct and/or upgrade "enormous amounts of broadband backbone."[38] The Commission noted that much of this new capacity is specifically being built to address Internet traffic needs.[39] Among the companies making these investments, the FCC specifically noted AT&T, Cable & Wireless, Qwest and Level 3, as well as MCI WorldCom (UUNET) and Sprint.

In the *Advanced Services Report,* the Commission explicitly concluded that there is no shortage of Internet backbone capacity, notwithstanding the dramatically growing demand stimulated largely by Internet usage.[40] The Commission found that "backbone facilities are being deployed in a reasonable and timely fashion"; that any arguable shortages were found to be temporary and very short-lived; and that the shortages were due to the "enormous increases in demand for one of the most successful technologies in recent history" and did not flow from market failures such as lack of capital, construction or technology constraints. The *Report* further sets forth the agency's expectation that the new "sizable investment will alleviate any short-term 'shortages' in broadband backbone."[41] Moreover, significant new investment in backbone capacity for Internet usage by providers such as AT&T and Level 3 is a clear indicator of the economic attractiveness and robustness of the markets for Internet access services.

In addition to growth from the deployment of new facilities, numerous ISPs and telecommunications carriers over the past two years have completed acquisitions that enabled new entrants to become facilities-based (backbone) providers and existing suppliers to expand

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37 *Id.* ¶ 35.

38 *Id.* ¶ 38.

39 *Id.*

40 *Id.* ¶ 44.

41 *Id.*

the reach and capacity of their networks. For example, AT&T's purchase of IBM Global Services and TCG Cerfnet substantially increased its network infrastructure and established AT&T as a significant global provider of backbone services. [42] Global Crossing, through its purchase of Frontier, extended its international network to the United States and added a major provider of web-hosting services, Global Center, to its product mix. Winstar's purchase of GoodNet, Intermedia's purchase of Digex, NextLink's purchase of Concentric, and McLeod USA's pending acquisition of Splitrock Services, Inc., will link the provision of competitive local exchange service and Internet services, thereby broadening the market for each. Moreover, AT&T's acquisition of TCI, and its proposed merger with MediaOne, will further strengthen its position as a provider of backbone services by giving it control of substantial "last mile" facilities.

3. Estimated Shares

As the Commission observed in the *Advanced Services Report*, it is difficult to obtain data specific to any segment of broadband businesses.[43] There is no reliable, generally accepted method for measuring ISPs' shares. For example, there is no government report or industry consensus reflecting relative shares for these Internet services. Many industry analysts use revenues to measure industry participants' relative shares. That approach, however, can provide

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42 *See* Cahners In-Stat Group, *Big Business: Rankings and Profiles of the Top U.S. ISPs Serving the Enterprise, 1999*, (October 1999), http://www.instat.com/catalog/cat-ia.htm#is9908sp (last visited Jan. 12, 1999) at p. 5 ("AT&T's successive acquisitions have given it an impressive share of the Internet market").

43 *See, e.g, Advanced Services Report, supra n. 22* ¶ 35. *See also* Local Competition and Broadband Reporting, *Notice of Proposed Rulemaking*, CC Docket No. 99-301, FCC 99-283 (rel. Oct. 22, 1999) ¶ 17 ("publicly available information sources present less than complete pictures of actual conditions and trends in . . . the deployment of broadband").

only at best rough estimates for several reasons. Actual total industry revenues are not known, and many providers of Internet services do not report revenues publicly. Furthermore, Internet revenues reported for one provider may not include the same services that other providers include in their calculations. Attachment 1 illustrates this problem. TeleGeography 1999 lists Cable and Wireless as the world's largest Internet service provider, measured in terms of the percentage of downstream ISPs served by a particular backbone. Other sources of share estimates may not agree with that conclusion.

The number of connections has been suggested as an alternative measure. However, the number of connections does not necessarily translate into revenues, which is a better (albeit imperfect) indicator of actual position in the marketplace. For example, the number of ISP connections does not indicate whether large, small, or medium-sized ISPs are connected, nor does it take into account the differing bandwidths of the connections. In addition, it is also important to keep in mind that simply because an ISP generates more overall revenue, or passes more traffic, or has more connections than another ISP, does not mean that provider has no interest in peering with other networks. The salient factors include how much traffic one provider exchanges with another provider at any particular interconnection point and whether each ISP provides roughly equivalent value to the other in this agreement, so that entities bear comparable costs and derive comparable benefits with respect to the peering arrangement.

Without endorsing specific share measurements, we provide in the attachments to this document various data obtained from available sources analyzing revenues and relative shares of Internet backbone providers. As noted in the attachments, various inconsistencies and other problems are inherent in each type of measurement and in the data provided. Nevertheless, one conclusion appears inescapable: Internet backbone services have experienced dramatic

expansion since 1997 and industry analysts predict continued and substantial growth by many providers. For example, in March 1999, Bernstein & Co. reported that what it refers to as "Internet backbone providers," which it defines to include wholesale services as well as business dial-up and business dedicated services, are expected to generate approximately $3 billion in wholesale revenues in 1999 and $8.8 billion in total revenues from wholesale and business services.[44] Using 1997 and 1998 revenues, estimated 1999 and forecasting figures through 2003, Bernstein Research predicted substantial growth in each sub-segment: 30% annual growth for wholesale services, 25% annual growth for business dial-up, and 55% growth for business dedicated access services.[45] These growth rate estimates are accompanied by predictions of further deconcentration among service providers.[46] One analyst recently testified that "[c]ompetition has caused MCI WorldCom to lose about 11% of its share since 1997; by 2003 it will have lost at least a quarter – especially given the entry of the Baby Bells and numerous new carriers into the space."[47]

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44 Bernstein Research, MCI World.com: Positioned to Win in a Data-Driven World, (March 1999) at p. 10. Neither figure includes consumer dial-up services. Bernstein describes the Internet backbone services market as "includ[ing] all of the wholesale and business retail revenues received for providing access to the Internet, including revenues from software and value-added services such as Web hosting, VPN and security, but excluding consumer retail access revenues." Bernstein at 9.

45 *Id.* at p. 10.

46 *Id.*

47 Presentation of Tod A. Jacobs, Senate Judiciary Committee Hearing on the MCI WorldCom / Sprint Merger (Nov. 4, 1999) at p. 3. (Mr. Jacobs is a Senior Telecommunications Analyst at Sanford C. Bernstein & Company, Inc.)

4. Traffic Exchange Arrangements

At the time of the WorldCom/MCI proceeding, commenters expressed concern that the merged company could have the ability to raise its rivals' costs by refusing to peer or degrading peering connections. Since that time, however, MCI WorldCom has continued to enter into additional peering arrangements at public as well as private exchanges and has upgraded its peering connections. Moreover, innovative content delivery technologies have reduced the need for content to travel long distances across networks. Finally, technological developments have facilitated an increase in multi-homing, which reduces any dependence of any customer on any single ISP.

Since March 1998, UUNET's North American Internet network has entered into peering arrangements with ten additional ISPs at both public and private exchange points in the United States.[48] In addition, since March 1998, UUNET and nine of its peers in the U.S. have increased the number of locations at which they interconnect and have expanded the capacity of the interconnections. Technological advances have contributed significantly to the growth in peering at public locations since 1998. In particular, the deployment of ATM switches has expanded the capability of NAPs to handle the demand for public peering by increasing the number of ports as well as the capacity available at NAPs. MCI WorldCom has upgraded its NAPs with additional ATM switches.

In addition to providing greater port and bandwidth capacity, the ATM switches have proven to be scalable. A large number of ISPs can be aggregated over a smaller number of ports and connections, thereby reducing the number of circuits and ports, and the amount of hardware,

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[48] The UUNET regional "backbone networks" have entered into peering relationships with 15 additional ISPs since March 1998 and now peer with 75 other ISPs globally.

that must be deployed, provisioned, and managed to accommodate any given amount of traffic, when compared to the shared FDDI and Ethernet architectures previously deployed at the MAEs. The ATM switch enables one ISP to connect on a point-to-point basis to a peer without the risk of carrying traffic from other ISPs at the NAP with whom the ISP does not peer (a risk that was likely with the shared FDDI and Ethernet architectures). In short, the deployment of ATM switches has been a major factor in solving the congestion and scaling problems in the earlier generation architectures.

At the same time, recent content delivery innovations, in particular mirroring and caching, have brought content closer to the end user, thereby reducing the need for content to travel long distances across networks. Mirroring is a process by which Internet sites copy entire files from other archives on a frequent basis. Content providers, data center providers, and ISPs install multiple "mirror" servers, each of which duplicates in its entirety the content and structure of the main server. As in the case of caching, accessing a mirror site close to the end user's location greatly reduces traffic over the Internet, and proves especially effective where website content is relatively dynamic.

Caching is a process by which a discrete piece of data, such as an Internet web page, is copied from a main server on the Internet to a remote (or "proxy") server closer to the end user, in anticipation of an end user's request for that data. The main purpose of caching is to make popular information content more readily and speedily accessible than if it had to be transmitted from the main server each time it was requested. Where the web page content is relatively static (such as a non-realtime audio or video feed), caching is an effective means of reducing utilization of Internet backbone networks.

ISPs and enterprises (corporate websites) also have increased their use of multi-homing, which refers to the practice of purchasing wholesale connectivity from different providers of Internet backbone services.[49] This increase may be due in part to a significant reduction in the cost of particular types of routers used by ISPs that wish to multi-home. According to Boardwatch, the prices of routers needed to facilitate BGP4, a routing protocol required for multi-homing, have fallen dramatically, from $10,000 to $2,000 - $3,000.[50] In addition, new technologies such as "Network Address Translation" have made it easier for customers to become multi-homed to more that one provider.[51] By reducing an ISP's dependence on a single provider, multi-homing enhances the reliability of the ISP's service to its customers and may also limit the ability of a backbone provider to raise the price of transit by providing competitive alternatives.

5. Public Interest

The period since the Commission approved the WorldCom / MCI merger has been characterized by dramatic growth in all phases of Internet services. Existing ISPs have expanded their networks to meet unprecedented growth in demand from residential and business customers

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49 Data obtained from Boardwatch Magazine indicate that the share of all backbone connections sold to multi-homing ISPs increased from 24% in 1997 and 1998 to 43% in 1999. *See* Boardwatch Magazine Directory of Internet Service Providers, Fall 1997, p. 6; Boardwatch Magazine Directory of Internet Service Providers, Winter 1998, p. 5; and Boardwatch Magazine Directory of Internet Service Providers, 11th Edition, 1999, p. 4.

50 *See* Avi Freedman, "Avi Returns: Configuring CAR and CEF to Shape Traffic and Kill Smurfs," Boardwatch, July 1999, http://boardwatch.internet.com/mag/99/jul/bwm96.html (last visited Jan. 12, 2000).

51 *See* Praveen Akkirajy, Cisco Consulting Engineer, *et al., Enabling Enterprise Multihoming with Cisco IOS Network Address Translation (NAT)* http://www.cisco.com/warp/public/cc/cisco/mkt/ios/nat/tech/emios_wp.htm (last visited Jan. 12, 2000).

as well as other ISPs. New entrants and smaller ISPs have evolved into significant facilities-based providers through new construction and strategic acquisitions. Peering arrangements, both public and private, have continued to increase so that end users have access to every point on the network of networks. Moreover, MCI WorldCom and Sprint have already committed to work cooperatively with policymakers to address and resolve concerns they may have with respect to adding Sprint's Internet backbone business to MCI WorldCom's. MCI WorldCom and Sprint are confident that at the conclusion of the Commission's review in this proceeding, it will conclude that the proposed merger is in the public interest.

Attachment 1

TeleGeography 1999

The World's Top ISPs (Winter 1998-99)

1 Carrier/ISP	2 Market Share of U.S. Backbone[1]	3 U.S. Backbone Speed[2]	4 Number of POPs	5 Total Quarterly Revenue
MCI WorldCom (UUNET, ANS, CNS)	22.53%	622 Mbps	Over 1,000	$ 4.96 billion (2Q98)
Sprint	21.19%	155 Mbps	320	$ 3.97 billion (2Q98)
GTE (BBN)	5.32%	155 Mbps	375	$ 6.28 billion (2Q98)
Cable & Wireless (includes iMCI)	28.43%	155 Mbps	493	$ 3.12 billion (1Q98)
AGIS	3.57%	155 Mbps	Over 200	n.a.
PSINet	1.84%	622 Mbps	Over 400	$ 44.5 million (1Q98)
Qwest (Eunet)	n.a.	622 Mbps	Over 400	$ 383.7 million (2Q98)

Source: TeleGeography 1999, at 122 (Figure 9) (© TeleGeography, Inc., 1998) (www.telegeography.com).

Comments:

- The number of POPs listed in column 4 does not distinguish between dial-up and dedicated POPs.
- The total quarterly revenue reported for both MCI WorldCom and Sprint appears to include both voice and non-Internet data traffic.

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1 The share percentage of the backbone market is measured in terms of the percentage of downstream ISPs served by a particular backbone.

2 Backbone speeds represent fastest nation-wide link per single fiber route.

The data provided in this Attachment have been independently produced by a third party. The methodology used to collect the data has not been made public. Neither MCI WorldCom nor Sprint makes any representations or endorsements as to the accuracy of the data, the method of calculation or the principles underlying the collating or presentation of such data.

Attachment 2

International Data Corporation,
"Internet Service Provider Market Review and Forecast"

Internet Service Provider Revenues and Share by Vendor, 1998

	Revenues ($M)	Share (%)
AOL	2,957	23
MCI WorldCom	2,200	17
GTE Internetworking	558	4
MSN	476	4
AT&T/CERFnet	415	3
Sprint	400	3
IBM Global Network (AT&T)	377	3
internetMCI/Cable & Wireless	345	3
PSINet	244	2
Other	4,664	37
Total	12,636	100

Source: International Data Corporation, "*Internet Service Provider Market Review and Forecast*", at p. 17.

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Attachment 3

Cahners In-Stat Group:
Show Some Backbone: ISPs Report Increasing Demand and Shifting Vendor Preference
(Author: Rick Miller, July 1999)

Backbone Providers Identified as Suppliers by U.S. ISPs, 1998

	National	Regional	Total Avg.
WorldCom (including UUNet, ANS, Compuserve, MCI)	40.9%	23.6%	25.2%
C&W (including services recently bought from MCI)	9.1%	16.7%	16.0%
Sprint	13.6%	12.5%	12.6%
AT&T-TCG-Cerfnet	22.7%	5.6%	7.1%
Digex	4.5%	5.6%	5.5%
Verio	4.5%	4.2%	4.2%
Local RBOC	0%	4.2%	3.8%
Agis	4.5%	2.8%	3.0%
GTE/BBN	9.1%	1.4%	2.1%
PSINet	0%	1.4%	1.3%
Winstar/Goodnet	9.1%	0%	0.8%
IBM GlobalLink (now AT&T)	4.5%	0%	0.4%
Other	18.2%	31.9%	30.7%
DK/Refused	4.5%	4.2%	4.2%
TOTAL	145.20%	114.10%	116.90%

Note: Multiple responses allowed.
Source: Cahners In-Stat Group, *Show Some Backbone: ISPs Report Increasing Demand and Shifting Vendor Preference,* at p. 7.

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Attachment 4

Boardwatch, December 1999 Issue

IV. Top 10 Backbone Providers

Company Name	No. of Connections	Market Share (%)
MCI WorldCom	1,784	21.15
Sprint	1,109	13.15
Cable & Wireless	681	8.08
AT&T	513	6.08
Verio	446	5.29
GTE Internetworking	419	4.97
PSINet	358	4.25
SAVVIS	323	3.83
Intermedia	296	3.51
Qwest	283	3.36
[AGIS][1]	[221]	[2.62]
[Others]		[23.71]

Comments:

The following item, published in Inter@ctive Week, concerns connection data provided in Boardwatch's ISP directories:

Fight by Numbers

Cable & Wireless (www.cwplc.com) is demanding a recount after a story this magazine published on October 18. Based on the numbers derived from several Boardwatch (www.boardwatch.com) directories, inter@ctive. Week concluded that C&W"s share of ISP business shrank from 1,848 connections in the winter of 1998 to 569 connections this fall. C&W execs say that number is incorrect and confronted Boardwatch's editor-in-chief and executives at its publisher, Penton, during the recent ISPCon trade show. The Ear hears that reps of both companies had to be confined to different rooms for subsequent meetings because emotions ran that high. C&W execs say that count stands at roughly 1,300. Boardwatch execs say they get their data directly from ISPs, and whatever the count is this winter they will print in the new millennium.

Inter@ctive Week, December 6, 1999 at 58.

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[1] Supplied in same source.

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Attachment 5

Sanford C. Bernstein & Co.
(Tod A. Jacobs, Senior Telecommunications Analyst)

INTERNET BACKBONE REVENUE AND SHARE FORECAST

Revenue (US$ MM)	1997	1999	2001	2003
MCI WorldCom	1,151	3,090	5,379	7,051
GTE-BBN	346	1,207	2,375	3,860
AT&T	322	924	2,206	4,120
Sprint	325	728	1,148	1,660
C&W	233	459	869	1,257
All Other	287	1,677	3,326	4,186
Total	2,664	8,085	15,303	22,134

Market Share				
MCI WorldCom	43%	38%	35%	32%
GTE-BBN	13%	15%	16%	17%
AT&T	12%	11%	14%	19%
Sprint	12%	9%	8%	7%
C&W	9%	6%	6%	6%
All Other	11%	21%	22%	19%
Total	100%	100%	100%	100%

Source: *Hearing on the MCI WorldCom-Sprint Merger Before the Senate Committee on the Judiciary,* Exhibit 3 (Nov 4, 1999) (Testimony of Tod A Jacobs, Senior Telecommunications Analyst, Sanford C. Bernstein & Co., Inc.).

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